SRO
STATE SCHOOL REFORM/REDESIGN OFFICE
Michigan Department of Technology, Management and Budget

Business Rules

Lowest Achieving 5% School Ranking
Priority Schools Identification

STATE SCHOOL REFORM / REDESIGN OFFICE
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Overview

The Michigan State School Reform/Redesign Office (SRO) Bottom Five Percent is a list of public schools in Michigan ranked according to student achievement and student growth on state assessments and, if applicable, graduation rates. All tested academic content areas are eligible to be included, and for schools that graduate students, graduation rate is included. Schools that do not meet student size minimums, subject area minimums, or schools that serve specialized populations of students will be excluded.

School-level values are calculated by aggregating student performance on statewide tests, including both general assessments and those based on alternate standards as described in the section on eligibility. All valid tests are included for eligible students.

Please note that all student level values (Student level Z-Scores, Student Growth Percentiles, Full-Academic-Year (FAY) status) are calculated by the Michigan Department of Education (MDE). More detailed information can be found below:

Help with Z-scores

Link: http://www.michigan.gov/documents/mde/Z-Score_Cheat_Sheet_372605_7_394088_7.ppt

What is a Student Growth Percentile?

Link: http://www.michigan.gov/documents/mde/Student_Growth_Percentiles_475671_7.pdf

Table of Contents

Common Acronyms and Abbreviations

Term	Detail
MDE	Michigan Department of Education
CEPI	Center for Educational Performance and Information
FAY	Full Academic Year
SGP	Student Growth Percentile
MGP	Mean Growth Percentile
ELA	English Language Arts
MEAP	Michigan Educational Assessment Program
MME	Michigan Merit Examination
M-STEP	Michigan Student Test of Educational Progress
SEE	Shared Educational Entity
ACT	College admissions test that made up a portion of the MME

Definitions

Term	Meaning
Z-Score	A measurement of a value's relationship to the average (mean) in a group. A Z-score of 0 (zero) means the value is equal to the average. A Z-score can be positive or negative, indicating whether it is above or below the average.
MEAP-Access	MEAP Access was an alternate assessment that was based on modified achievement standards aligned to the state standards.
MI-Access	Michigan's alternate assessment system, designed for students who have, or function as if they have, cognitive impairments.
Graduation Rate	A percentage calculated by dividing the number of students who graduate by the number of students who began the cohort for that particular graduating class.
Feeder School	The school where the student was enrolled and the school responsible for the content standards being assessed on the test.
Cohort	Students grouped together based upon grade, entry year, or expected graduation year.
Center Based Program	Schools that serve exclusively special education populations. Determination is completed by the Michigan Department of Education.

Narrative Description

The Bottom Five Percent is a list of ranked schools based on student achievement and student growth as measured on academic content area state assessments over a two-year period as well as, in some cases, graduation rate. The content tested in the 2013-14 school year MEAP/MME were reading, mathematics, science, social studies, and writing. The content tested on 2014-15 M-STEP are ELA, mathematics, science, and social studies. Student performance results on academic content area tests are further separated in grade span groupings. Specifically, content at the elementary/middle school (3-8) and the high school (9-12) levels are treated as distinct. In order to satisfy selection criteria, schools must have tested at least two subjects across both school years 2013-14 and 2014-15. For example, a school with grades K-3 may have tested only mathematics and ELA at the elementary/middle level. Alternately, a large K-12 school may have tested mathematics, science, and social studies at both elementary/middle and high school levels resulting in up to six subjects included in the calculations.

The Bottom Five Percent is generated through a series of aggregations utilizing assessment results for only Full Academic Year (FAY) students. FAY students are those determined by the MDE to be enrolled for the entire school year. Student Z-Scores are aggregated to create a school level achievement score for each subject. At the same time, valid Student Growth Percentiles (SGPs) are aggregated into Mean Growth Percentiles (MGPs) to create an overall school level growth score for each subject. Next, the aggregated subject achievement and growth scores are converted into school-level Z-Scores placing each school's score value on the same scale. These are then combined with equal weights of 50% achievement and 50% growth to create an overall subject value. Achievement alone is used if MGPs are not available or if the percent proficient is 90% or higher. Overall school subject scores are converted into Z-Scores and then combined into a weighted school score across all subjects. The number of students tested in each subject is used as a weighting factor for that subject when the school index is calculated (See Example Table 1). For schools that graduate students, a graduation rate index is also calculated, comprising 10% of the overall school score, with the remaining 90% divided among the appropriate subjects. Graduation rates are calculated by the Center for Educational Performance and Information (CEPI).

Table 1.

Weighting Subjects by Full Academic Year (FAY) counts - an example

Sample School has 600 total assessments given across all grades and subjects:

- ELA 200 students were tested
- Mathematics 200 students were tested
- Science 150 students were tested
- Social Studies 50 students were tested

Relative Weights for FAY tested students in each subject area are:

- ELA 33.3% (200/600)
- Mathematics 33.3% (200/600)
- Science 25.0% (150/600)
- Social Studies 8.3% (50/600)

Eligibility

Assessment score and Student Growth Percentile

In order to be included in the overall Bottom Five Percent calculation, an assessment score or Student Growth Percentile must meet several requirements:

- Assessments must be from a general or alternate summative assessment. MEAP, MI-Access, MEAP-Access, MME, and M-STEP are all utilized.
- Scores are attributed to the school designated as the feeder school.
- The assessment score must be valid (i.e., all rules for completing a test must be met; there must be no prohibited behavior, misadministration of test, etc.).
- The assessment must have been completed by a public school/public school academy student. No scores from private school or home schooled students are included.
- The assessment must have been completed by a student who has been determined to be Full Academic Year (FAY). Scores from students who were enrolled for less than FAY will not be assigned to the feeder school.
- The assessment must have been completed by a student who is not primarily educated by a Shared Educational Entity (SEE). Thus, scores from SEE students are not included.
- The Student Growth Percentile must be for a student who has been determined to be Full Academic Year (FAY).
- The Student Growth Percentile must be for a student who is not primarily educated by a Shared Educational Entity (SEE).

Subject

- In order to be included in a school's overall Bottom Five Percent calculation, at least 30 FAY students must have been tested each year in the same subject for two consecutive years.
- Student Growth Percentiles are included in the subject value only if at least 20 FAY students have SGP values.

Graduation Rate

In order to be included as part of a school's Bottom Five Percent calculation:

- The school must graduate students.
- The school has graduation rates calculated by CEPI for each of the two most recent years.
- The graduation rate used is the best rate among two averages among the four-, five-, or six-year cohort rates.

School

In order to be included in the list, a school must meet the following eligibility requirements:

- Must have at least 30 FAY students, in at least two different two subjects, for the two most recent school years.
- Center-Based Programs are not eligible for inclusion in the Bottom Five Percent list. Center-Based Program are schools that serve exclusively special education populations as determined by the Michigan Department of Education.
- Shared Educational Entitys (SEE) are not eligible for inclusion in the Bottom Five Percent calculation.
- All schools open as of June 30, 2015 and also which have data attributed from the most recent school year, will be included in the Bottom Five Percent calculations, even if the school is closed at the time of the release of the Bottom Five Percent list.
- Final percentile ranks are only provided for to schools with rank 0, 1, 2, 3, or 4; or those schools currently under the authority of the State School Reform/Redesign Office.

Calculation Methodology

This procedure uses student Z-Scores, Student Growth Percentiles, and Full Academic Year (FAY) determinations that are maintained by the Michigan Department of Education (MDE) and are available for use by the State School Reform/Redesign Office in a database format.

Calculation Conventions

- The definitive version of all calculations is based upon mathematical operations as performed by SAS Enterprise Guide 5.1.
- According to the MDE, student Z-Scores satisfy three conditions: (1) calculated for FAY students only; (2) have a *van der Waerdens transformation* applied to put them into a more nearly-normal distribution; (3) are capped at a maximum of +2 and a minimum of -2.
- Overall school percentile ranks are truncated to the integer level (the decimal portion is deleted and rounding is not completed.)
- Schools with a close date on or after June 30 of the final year of accountability (2015) will receive a ranking. Schools with a closed date prior to June 30 of the final year of accountability (2015) do not receive a rank.

I. Initial student score aggregation.

Calculate the following aggregates, split out by year, school, and subject:

a. The count of FAY students with valid test scores.
b. The mean of the Z-Scores of FAY students.
c. The mean of available SGPs of FAY students (MGP).
d. The percent proficient of FAY students.

II. Subject-level table.

Create a row for each subject in schools and indicating (including each value for the current and previous year).

a. The count of FAY tested scores.
b. The mean Z-Score.
c. The MGP.
d. The percent proficient.

III. Subject-level calculations

a. Determine subject eligibility for achievement using the subject eligibility rules outlined above (i.e., the value calculated in II.a above is greater than or equal 30 in each of the last two years).

b. Calculate the total number of FAY tested for both years by summing both years of the number calculated in section II.a. above that meet the minimum FAY count of 30.
c. Calculate the weighted (on student count) two-year averages for II.b., II.c., II.d.:
    i. Each calculation will take the form of:

$$\frac{(Val_{Current} * FAY_{Current}) + (Val_{Prior} * FAY_{Prior})}{(FAY_{Current} + FAY_{Prior})}$$

    Where 'Val' is the value of interest, 'FAY' is the count of Full-Academic-Year tested students, and 'Current' and 'Prior' refer to each of the two years of assessment results to be used in the application of the Bottom Five Percent list.
d. Calculate the Z-Score for each of the two-year averages:
    i. Calculate the statewide average and standard deviation for mean achievement (Z-scores) and MGP, using only eligible subjects as described above in section III.a.
    ii. Calculate the achievement and growth school Z-Scores for each subject using the following formula:

$$\frac{(\hat{\mu}_{zj} - \hat{\mu}_z)}{\hat{\sigma}_z}$$

    Where $\hat{\mu}_{zj}$ is the two-year weighted statewide average of the value of interest for school j, $\hat{\mu}_z$ is the statewide average, and $\hat{\sigma}_z$ is the statewide standard deviation.
e. Combine the achievement and growth Z-Scores into the subject index, based upon:
    i. If the two-year weighted percent proficient is greater than or equal to 90%, or if growth is not available, use only the achievement score.
    ii. Otherwise, compute a value using half (50%) achievement and half (50%) growth.
f. Calculate the weighting of each subject in the final score based upon the number of student scores:
    i. Sum the total number of tests taken by eligible students in all eligible subjects.
    ii. The subject weight is:

$$\frac{n_j}{n_t}$$

    Where n_j is the count of tests taken by eligible students in the eligible subject and n_t is the total number of tests taken by eligible students across all eligible subjects.

g. Calculate the subject index Z-Score for each eligible subject:
    i. Determine the statewide average and standard deviation for the subject index, using only eligible subjects as described above.
    ii. Calculate the subject Z-Score for each subject using the following formula:

$$\frac{(\hat{\mu}_{zj} - \hat{\mu}_z)}{\hat{\sigma}_z}$$

    Where $\hat{\mu}_{zj}$is the two-year weighted average of the subject index for school *j*, $\hat{\mu}_z$ is the statewide average, and $\hat{\sigma}_z$ is the statewide standard deviation.
h. Create final subject index values by applying the subject weight from section III.f. by multiplying the subject Z-Score (section III.g.) by the subject weight.

IV. Graduation rate calculations

a. Determine graduation rate eligibility.
b. Use the graduation rates for schools as calculated by CEPI.
    i. For each school, retrieve the graduation rate for years (n-1) to (n-5) where n is the current school year. Because the graduation rate is offset by a year, the most recent rate will be from the year prior to the current Bottom Five Percent calculation.
    ii. In cases where a school has multiple graduation rate records (schools that have changed districts), only the rates that matches the current district code as recorded in CEPI's Education Entity Master are used.
    iii. Use only graduation rate records for the All Students group.
    iv. Retrieve graduation rates for the 4-, 5-, and 6-year cohorts, where data is available.
    v. Only include graduation rates that have been calculated by CEPI.
c. For each set of cohorts records in each school, calculate the following (these cohort means are unweighted):
    i. The mean of the graduation rates for four years.
    ii. The mean of the "academic year id" value for four years.
    iii. The mean of the graduation rates for three years.
    iv. The mean of the "academic year id" value for three years.
    v. The mean of the graduation rates for two years.
    vi. The change in graduation rate between years (n-2) to (n-1).
d. Calculate improvement slopes for available rates from section IV.b. The improvement slope formula is:

$$\frac{\sum((x-\bar{x})*(y-\bar{y}))}{\sum(x-\bar{x})^2}$$

    Where x is the academic year id value, y is the graduation rate value, and $\bar{x}$ and $\bar{y}$ are the multi-year means of each, respectively.
e. Calculate the Z-Score for each graduation rate metric, for all cohorts, for all eligible schools.
    i. Determine the statewide average and standard deviation for 1) the four-year improvement slope; 2) the three-year improvement slope; 3) the two-year change; 4) the two-year mean graduation rate; and 5) the most recent graduation rate.
    ii. Calculate the Z-Score for each metric using the following formula:

$$\frac{\left(\hat{\mu}_{zj}-\hat{\mu}_z{}^{4y}\right)}{\hat{\sigma}_z{}^{4y}}$$

    Where $\hat{\mu}_{zj}$ is the two-year weighted average of the metric of interest for school *j*, $\hat{\mu}_z{}^{4y}$ is the statewide average of the four-year cohort, and $\hat{\mu}_z{}^{4y}$ is the standard deviation of the four-year cohort.

    Note: Z-Scores for five- and six-year cohorts are calculated using the statewide mean and statewide standard deviation from the four-year cohort.

f. Determine the best cohort graduation rate:
   i. Determine which of the three cohorts (four-, five-, or six-year) has the highest two-year mean graduation percentage rate.
   ii. The graduation rate index calculated in section IV.e. that corresponds to this 'best' cohort rate will be used.
   iii. Likewise, the graduation rate improvement index calculated in section IV.e. that corresponds to this cohort will used. That is, the graduation rate improvement rate used will correspond with the graduation rate (4-, 5-, or 6-year cohort) used.

   Note: The improvement index that corresponds to the highest two-year mean graduation rate will be used, even if the overall index is not the highest value among the cohorts.

g. Calculate the graduation rate index:
   i. If the two-year mean graduation rate is greater than or equal to 90%, use the only Z-Score of the two-year mean graduation rate calculated in section f.ii.
   ii. Otherwise, calculate a composite value using the Z-Scores calculated in section f.ii and f.iii, composed of:
      1. Two-thirds (2/3) of the two-year mean graduation rate.
      2. One-third (1/3) of the graduation rate improvement metric – preferentially use the four-year improvement slope; the three-year improvement slope; the two-year change, as available.

h. Calculate the Z-Score for the final graduation rate index for eligible schools:
   i. Determine the statewide average and standard deviation for the graduation rate index.
   ii. Calculate the Z-Score for each metric using the following formula:

$$\frac{\left(\hat{\mu}_{zj} - \hat{\mu}_z{}^{4y}\right)}{\hat{\sigma}_z{}^{4y}}$$

   Where $\hat{\mu}_{zj}$ is the graduation rate index for school j, $\hat{\mu}_z{}^{4y}$ is the statewide average graduation rate index, and $\hat{\mu}_z{}^{4y}$ is the statewide standard deviation of the graduation rate index.

V. School-level calculations

a. Determine school eligibility using the school eligibility rules outlined above in section III.a.
b. Calculate the overall combined performance index:
   i. Sum the weighted values (section III.h.) of each eligible subject performance index for each eligible school.
   ii. For schools that have a graduation rate Z-Score calculated in section IV.h., include the graduation rate index as 10% of the combined performance index, with the weighted subjects making up the remaining 90%.
c. Rank the schools on the combined performance index, with a rank of 1 corresponding to the highest index value.
d. Convert the ranking into a percentile rank:

i. Provide school percentile rankings that meet the following requirements:
   a. Schools with rank 0, 1, 2, 3, or 4
   b. Schools currently under the authority of the State School Reform/Redesign Office.

ii. Use the following formula:

$$100 * \frac{R - r_j}{R}$$

Where R is the maximum rank value obtained in section V.c. and r_j is the ranking of school *j* from section V.c.

iii. Truncate any decimals. Note that this is not a rounding function; discard any decimals, leaving only the whole number.

Resource Information

MDE	Michigan Department of Education, www.michigan.gov/mde
CEPI	Center for Educational Performance and Information, www.michigan.gov/cepi
FAY	Full Academic Year Students, www.michigan.gov/documents/mde/Full_Academic_Year_Business_Rules_516581_7.pdf
SGP, MGP	Student Growth Percentiles and Mean (Student) Growth Percentiles www.michigan.gov/documents/mde/Student_Growth_Percentiles_475671_7.pdf
ELA	English Language Arts, www.michigan.gov/mde/0,4615,7-140-28753_64839_65510---,00.html
MEAP	Michigan Educational Assessment Program, used up to the 2013-14 school year www.michigan.gov/meap
MME	Michigan Merit Examination, used up to the 2013-14 school year www.michigan.gov/mme
M-STEP	Michigan Student Test of Educational Progress, begun in the 2014-15 school year www.michigan.gov/mstep
SEE	Shared Educational Entity, www.michigan.gov/mde/0,4615,7-140-22709_56877---,00.html
ACT	ACT College Readiness Assessment, www.michigan.gov/mde/0,4615,7-140-22709_35150---,00.html

Z-Score	Z Score methodology for assessments, www.michigan.gov/documents/mde/Z-Score_Cheat_Sheet_372605_7_394088_7.ppt
MEAP-Access	An alternative Assessment formerly used by MDE, www.michigan.gov/mde/0,1607,7-140-22709_28463-206774--,00.html
MI-Access	Michigan's current alternative assessment system for individuals with disabilities, www.michigan.gov/mde/0,1607,7-140-22709_28463---,00.html
Graduation Rate	Definition of and how to improve graduation rates, www2.ed.gov/documents/college-completion/practical-steps-to-improving-retention-and-graduation-rates.doc
Center Based Program	Center Based Model as used in Special Education www.michigan.gov/documents/mde/Center-based_Model_408832_7.pdf